mation of certain carbohydrates, suitable for forming the partition walls, into gums rich in oxygen. Parasites and saprophytes affect the formation of gum only by creating or enlarging rifts or wounds, hindering their recovering and recovery, and so making possible the access of oxygen. Experimental proofs are adduced for this view, whose probability is increased by many chemical considerations.—C. R. B.

**Fixation of free nitrogen.**—Dr. CHARLOTTE TERNETZ, baffled in an attempt to identify the pycnidial fungi which belong to the endotrophic mycorhiza of the Ericaceae, turned to a study of the ability of these fungi to fix free nitrogen when grown in N-free cultures.[25] The fungi doubtless belonged to the genus Phoma, and five species are described, derived from the roots of as many genera. These all fix atmospheric nitrogen, though in very different amounts. The three from Vaccinium, Oxycoccus, and Andromeda, while they work far less energetically in this respect than most N-fixing bacteria, nevertheless gain the largest amount of nitrogen of any known organisms in comparison with the amount of carbohydrate consumed. *Aspergillus niger* and *Penicillium glaucum* likewise are capable of fixing free N in small amounts, comparable with those yielded by the other two Phomas from the roots of Tetralix and Erica.

It may be that this action, relatively small when the fungi are grown in culture media, is much more pronounced when the mycelium grows in the cortex, and that we have here proof of the advantages which the Ericaceae derive from this association. The author's cultures show that the infection may be transmitted through the seeds and does not come necessarily from the soil.—C. R. B.

**Development of leaves.**—LEWIS[26] has published a second study of leaf development, in which he shows "that the basipetal and basifugal directions of growth may both occur in a single leaf; and that, although one becomes predominant, evidences of the other are apparent." In a previous paper[27] he discussed the question whether certain forms of adult leaves could be due to arrested development, "so that by comparing the mature leaves of a given plant something of their embryological history could be learned." The general conclusion is that leaves of very diverse species show a common method of leaf development, in which the basipetal and basifugal directions of growth are combined; and by the predominance of the basipetal or the basifugal elements, palmate or pinnate leaves are produced respectively. The author thinks that there is shown a determinate evolution of leaf forms, whereby diverse species tend to produce similar shapes. Plants with simple leaves constantly show tendencies toward compounding. "The persistent production of the similar forms of compound leaves which have been described is evidence in favor of determinate or orthogenetic evolution."—J. M. C.

[25] TERNETZ, CHARLOTTE, Ueber die Assimilation des atmosphärischen Stickstoffes durch Pilze. Jahrb. Wiss. Bot. **44**:353–408. 1907.

[26] LEWIS, FREDERIC T., A further study of leaf development. Amer. Nat. **41**: 701–709. 1907.

[27] Amer. Nat. **41**:431–441. 1907.